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| 10/520,816 | 01/07/2005 | Susumu Matsumoto | 71971-109 | 4853 |
| 20277 7590 04/29/2008 MCDERMOTT WILL & EMERY LLP 600 13TH STREET, N.W. WASHINGTON, DC 20005-3096 | | | | |
| EXAMINER | | | | |
| MATTHEWS, COLLEEN ANN | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/520,816

Applicant(s)

MATSUMOTO ET AL.

Examiner

Colleen A. Matthews

Art Unit

2811

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SG/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3-6, 8-11 and 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pub. No. 2003/0001273 to Steiner et al. (Steiner).

Regarding claim 1, Steiner discloses an electronic device comprising:

a low dielectric constant (Figure 6 42, paragraph 19 lines 20-21) film having a hole (90) and a trench (82) formed in at least an upper portion of the low dielectric constant film to be connected with the hole;

a nitrogen-non-containing insulating film (36, paragraph 22) formed under the low dielectric constant film; and

a nitrogen-containing insulating film (30, paragraph 20 lines 4-8) formed under the nitrogen-non-containing insulating film,

wherein at least a part of the trench (82) is located in the same low dielectric constant film (42) where the hole (90) is formed, and the hole is located below the trench (a portion 78 of the hole, 90, is located below trench 82).

Regarding claim 3, Steiner discloses the device of claim 1, where the lower surface of the low dielectric constant film (42) is in contact with the upper surface of the nitrogen-non-containing insulating film (36).

Regarding claim 6, Steiner discloses an electronic device comprising:

a low dielectric constant (Figure 6 42, paragraph 19 lines 20-21) film having a hole (90);

a nitrogen-non-containing insulating film (48) formed over the low dielectric constant film; and

a nitrogen-containing insulating film (54) formed over the nitrogen-non-containing insulating film,

wherein a trench (82), which is connected with the hole (90) is formed in the nitrogen-containing insulating film (54) and at least an upper portion of the low dielectric constant film (42), and

at least a part of the trench is located in the same low dielectric constant film (42) where the hole (90) is formed, and the hole is located below the trench (a portion 78 of the hole, 90, is located below trench 82).

Regarding claim 11, Steiner discloses an electronic device comprising:

a low dielectric constant film (42, paragraph 19 lines 20-21) having a hole (90);

a first nitrogen-non-containing insulating film (36, paragraph 22) formed under the low dielectric constant film; and

a second nitrogen-non-containing insulating film (48, paragraph 22) formed over the low dielectric constant film,

wherein a trench (82), which is connected with the hole (90), is formed in the second nitrogen-non-containing insulating film (48), at least a part of the trench (82) is located in the same low dielectric constant film (42) where the hole (90) is formed, and the hole is located below the trench (a portion 78 of the hole, 90, is located below trench 82), and

the lower surface of the low dielectric constant film (42) is in contact with the upper surface of the first nitrogen-non-containing insulating film (36).

Regarding claims 4-5, 9-10 and 14-15, Steiner discloses the device of claims 1, 6 and 11, where the low dielectric constant film is a carbon-containing silicon oxide film or a porous film (paragraph 19 lines 20-21). Steiner further discloses the carbon-containing silicon oxide film as a SiOC film (paragraph 19 lines 20-21).

Regarding claim 8, Steiner discloses the device of claim 6, where the upper surface of the low dielectric constant film (42) is in contact with the lower surface of the nitrogen-non-containing insulating film (48).

Regarding claim 13, Steiner discloses the device of claim 11, where the upper surface of the low dielectric constant film (42) is in contact with the lower surface of the second nitrogen-non-containing insulating film (48).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.

Pub. No. 2003/0001273 to Steiner et al. (Steiner) in view of Applicant's Admitted Prior Art (AAPA) of Figure 3 and 4a-4f and specification pages 27-32.

Regarding claim 2, Steiner discloses the device of claim 1, where the hole (90) passes through the nitrogen-non-containing insulating film (36) and the nitrogen-containing insulating film (30). Steiner lacks disclosing the device further including a lower-level interconnect which is located under the hole and connected with the hole, and the upper surface of the lower-level interconnect, except for a region in which the lower-level interconnect is connected with the hole, is covered with the nitrogen containing insulating film.

The AAPA of Figures 3 and 4A-4F discloses a device including a lower-level interconnect (22) which is located under the hole (27) and connected with the hole, and the upper surface of the lower-level interconnect, except for a region in which the lower-level interconnect is connected with the hole, is covered with the insulating film (23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Steiner to include a lower-level interconnect under the hole as in the AAPA in order to provide electrical connection to other circuitry.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.

Pub. No. 2003/0001273 to Steiner et al. (Steiner) in view of U.S. Pub. No.

2002/0102779 to Yang.

Regarding claim 7, Steiner discloses the device of claim 6. Steiner lacks disclosing the nitrogen-containing insulating film is an anti-reflection film.

Yang teaches a nitrogen-containing insulating film (Fig 2F element 210, paragraph 21) as an anti-reflection film formed over a dielectric film. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Steiner to have the nitrogen-containing insulating film as an anti-reflection film as in Yang in order to limit reflection during patterning.

Response to Arguments

Applicant's arguments filed 01/18/2008 have been fully considered but they are not persuasive.

Applicant argues (Remarks page 6) that Steiner fails to disclose the claimed hole (90) as having parts in the same low dielectric constant film (42) as the claimed trench (82) and also having the hole located below the trench. It is the examiners position that the hole, 90, is located below the trench 82 because a portion of the hole, element 78, is located below the trench 82.

Applicant argues (Remarks page 7) that the nitrogen-non-containing insulating film is 30 is between two different low dielectric constant films 18 and 42. Examiner notes that Steiner discloses all the elements of the claimed invention. The fact that

Steiner also discloses other features, such as an additional low dielectric constant film, does not compromise the fact that Steiner anticipates the claim.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colleen A. Matthews whose telephone number is (571)272-1667. The examiner can normally be reached on Monday - Friday 8AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2811

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. A. M./
Examiner, Art Unit 2811

/Lynne A. Gurley/
Supervisory Patent Examiner, Art
Unit 2811